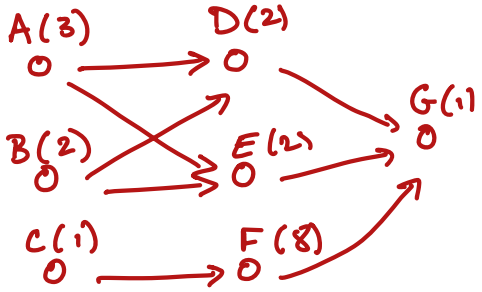
Worksheet 15 (Scheduling 1): Priority Lists and Decreasing Time Algorithm

Group Names: _____

1. The following tasks need to be completed for a project.

Task	Time Required	Prerequisites
A	3 hours	
B	2 hours	
C	1 hour	
D	2 hours	A, B
E	2 hours	A, B
F	8 hours	C
G	1 hours	D, E, F

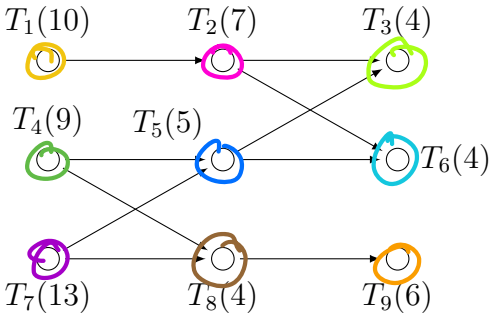


(a) To the left of the chart, draw a digraph to represent this project.

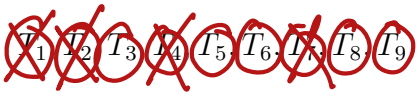
(b) If there is only one processor, how long will it take to complete the project? 19 hours

(c) The critical time can be determined by looking at the longest sequence of tasks in the digraph, called the critical path.
What is the critical path for this project? C → F → G
What is the critical time? 10

2. Consider the following digraph:

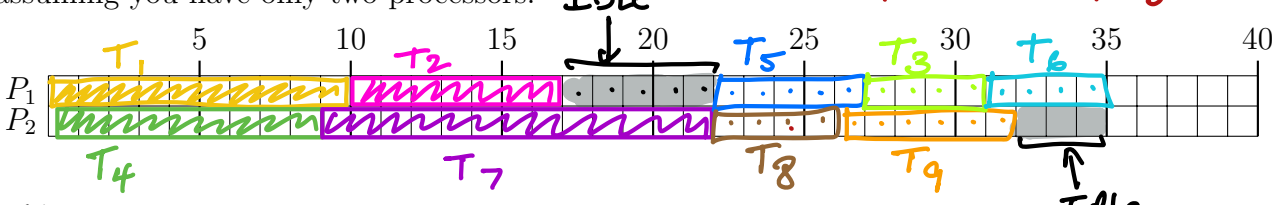


(a) Create a schedule using the priority list



assuming you have only two processors.

Time	Ready	Done
0	T_1 T_4 T_7	
9		T_4
10	T_2	T_1
17		T_2
22	T_5, T_8	T_7
26	T_9	T_8
27	T_3, T_6	T_5
31		T_3



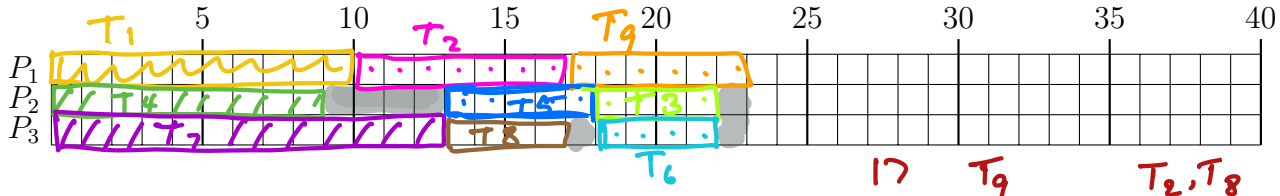
(b) How many hours was P_1 idle? 5 P_2? 3

(b) Create a schedule using the same priority list

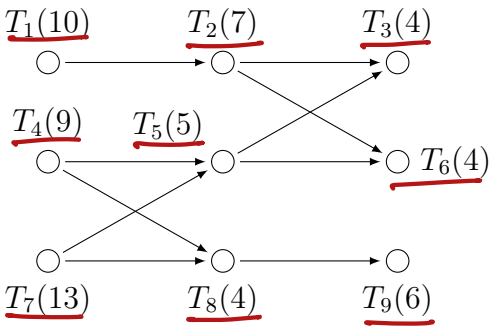
$T_1, T_2, T_3, T_4, T_5, T_6, T_7, T_8, T_9$

assuming you have three processors.

Time	Ready	Done
0	T_1 T_4 T_7	
9		T_4
10	T_2	T_1
13	T_5, T_8	T_7
17	T_9	T_2, T_8
18	T_3 T_6	T_5



3. Consider the same digraph:



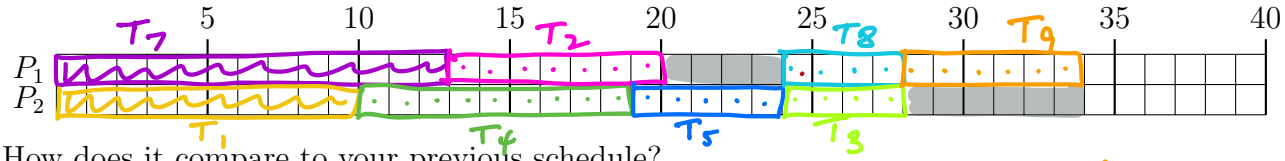
Time	Ready	Done
0	T_7 T_1 T_4	
10	T_2	T_1
13		T_7
19	T_5 T_8	T_4
20		T_2
24	T_3 T_6	T_5
28	T_9	T_8, T_3

The Decreasing Time Algorithm says: Create the priority list by listing the tasks in order from longest completion time to shortest completion time.

(a) What priority list do you get if you prioritize the tasks using the Decreasing Time Algorithm?

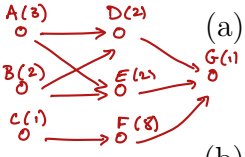
$T_7, T_1, T_4, T_2, T_9, T_5, T_3, T_6, T_8$

(b) Create a schedule using the priority list you just found, assuming you have only two processors.



How does it compare to your previous schedule? one day shorter. More idle time

4. Go back to the original digraph you constructed in Problem 1.



(a) What prioritization do you get if you use the Decreasing Time Algorithm for this list of tasks?

F A B E D C G

(b) What schedule do you get with that prioritization, using two processors?

Time	Ready	Done
0	A B C	
2		B
3	F D E	A, C
5		D
7		E
11		F
12		G